Auxiliary Flue Gas Measurements

Auxiliary flue gas measurements were performed using a portable O_2 analyzer (as described below) and H_2O by EPA Method 4 (condensation/gravimetric analysis). These measurements were collected as integral parts of all Hg speciation tests at all locations.

O_2 Determination

O_2 is measured by a portable O_2 analyzer using an electrochemical cell. The gas sample for the portable analyzer is drawn through a tube inserted in the exit gas of the sample gas meter. This provides direct analysis of the gas sampled for the Hg test. Care should be taken so that the O_2 sample tube is not inserted so far that it interferes with the meter orifice pressure differential reading. Calibration procedures for the portable analyzer include the following:

- At the beginning of each test condition, the instrument is calibrated on ambient air. As-found readings are then taken using zero gas and a mid-scale O_2 calibration gas (40%–60% of the span to be used to collect readings). If these as-found readings are within 2% of span (0.2% O_2 if the 10% scale is used), the data are acceptable. If the readings are outside of these ranges, the O_2 cell should be replaced, the instrument should be repaired, or an alternate instrument should be used.
- During testing, the calibration of the instrument is checked daily on ambient air. The as-found reading is taken, and the instrument is recalibrated on ambient air.

At the end of the test condition, the calibration error step described above is repeated.

CO_2 Determination

CO_2 is used for molecular weight determination. At the stack, CO_2 readings are taken from the plant continuous emission monitor (CEM). If the CEM readings are on a wet basis, they are converted to a dry basis using the moisture content measured by the Hg train. If the CEM is out of service or does not provide CO_2 measurements, the CO_2 content is calculated stoichiometrically from a fuel analysis.

Chlorides, NH_3, and SO_3

To measure chloride concentrations in the flue gas, EPA Method 26A was used. This method was designed to measure both the HCl/HF and Cl_2 concentrations in the flue gas. However, when SO_2 was present in the flue gas, it was found that the method only provides total chlorides [1]. The impinger train is operated similarly to other sampling procedures such as EPA Method 5. Once the chlorides are collected in the solutions, they are analyzed using ion chromatography techniques. For SO_3 measurements, the controlled condensation technique was used. For NH_3 analyses, the flue gas is absorbed in 0.1 N HCl solution, and the NH_3 is measured using a selective ion electrode.

Reference

1. Sun, Q.; Crocker, C.R.; Lillemoen, C.M. The Effect of Coal Combustion Flue Gas Components on Low-Level Chlorine Speciation Using EPA Method. In *Proceedings of the 92nd Annual Meeting & Exhibition of Air & Waste Management Association*; St. Louis, MO, June 20–24, 1999.

B
MERCURY MEASUREMENTS

B.1 Mercury Measurements Made at Site S2

Complete OH Data Set

Table B-1
OH Mercury Data for Site S2 with the SCR in Service

	Hours into Test		$\mu g/Nm^3$			
Date	**Start**	**End**	**Hg_p**	**Hg^{2+}**	**Hg^0**	**Hg_{Total}**
SCR Inlet						
07/17/02	58.0	59.2	0.01	7.6	4.8	12.4
07/18/02	85.6	87.6	0.09	5.4	7.5	13.0
07/19/02	106.9	108.9	0.03	6.5	4.2	10.7
Average			0.04	6.5	5.5	12.0
SCR Outlet						
07/17/02	58	58.6	0.14	11.1	3.3	14.6
07/18/02	85.6	87.6	0.03	11.8	0.8	12.6
07/19/02	106.7	108.7	0.02	9.5	0.5	10.1
Average			0.06	10.8	1.6	12.4
ESP Inlet						
07/18/02	90.1	91.6	0.00	12.2	0.5	12.7
07/19/02	110.8	112.3	0.06	12.2	0.2	12.4
Average			0.03	12.2	0.3	12.6
ESP Outlet						
07/18/02	90.8	92.3	0.00	11.3	0.5	11.8
07/19/02	110.9	112.9	0.00	10.9	0.2	11.1
Average			0.00	11.1	0.3	11.5
Stack						
07/18/02	91.2	93.2	0.00	0.5	1.4	1.8
07/20/02	132.9	134.9	0.00	0.9	1.2	2.1
Average			0.00	0.7	1.3	2.0

Coal Mercury and Chloride Analyses

Table B-2
Coal Analysis Completed at Site S2

Date	Chloride, ppm	Mercury, ppm
7/15/2002	672	0.10
7/15/2002	733	0.12
7/16/2002	577	0.15
7/16/2002	689	0.11
7/17/2002	724	0.12
7/17/2002	717	0.14
7/18/2002	605	0.11
7/18/2002	605	0.11
7/19/2002	593	0.11
7/20/2002	609	0.13
7/21/2002	635	0.12
7/22/2002	638	0.12
7/23/2002	639	0.12
7/23/2002	686	0.13
7/24/2002	704	0.11
7/24/2002	658	0.12
7/25/2002	601	0.10
7/25/2002	656	0.11
7/26/2002	640	0.11
7/27/2002	650	0.13
7/28/2002	602	0.10
7/28/2002	569	0.14
7/29/2002	640	0.12
7/29/2002	637	0.12
7/30/2002	646	0.14
7/30/2002	655	0.10
7/31/2002	684	0.14
7/31/2002	636	0.15
08/1/2002	710	0.15
08/2/2002	624	0.13
8/03/2002	630	0.10
8/03/2002	570	0.17
8/04/2002	648	0.10
8/04/2002	619	0.11
8/05/2002	561	0.07
8/06/2002	680	0.10
8/06/2002	617	0.10
8/07/2002	600	0.13
8/08/2002	591	0.16
8/09/2002	617	0.11
8/09/2002	621	0.11
8/10/2002	654	0.14
8/10/2002	622	0.14
8/10/2002	582	0.13
8/10/2002	561	0.13
Average	636	0.12
Standard Deviation	44	0.02

B.2 Mercury Measurements Made at Site S4

Complete OH Data Set

Table B-3
OH Mercury Data for Site S4 with the SCR In Service

	Hours into Test		$\mu g/Nm^3$			
Date	Start	End	Hg_p	Hg^{2+}	Hg^0	Hg_{Total}
SCR Inlet						
9/11/02	63.8	65.8	0.04	5.6	8.1	13.8
9/12/02	86.9	88.5	0.11	3.0	7.8	10.9
9/13/02	107.7	109.0	0.00	3.2	8.9	12.1
Average			0.05	4.0	8.3	12.3
SCR Outlet						
9/11/02	63.8	64.8	0.01	12.0	3.0	15.1
9/12/02	87.0	88.3	0.00	2.8	4.6	7.4
9/13/02	107.8	108.8	0.00	6.3	5.2	11.5
Average			0.00	7.1	4.3	11.3
AH Outlet						
9/11/02	63.7	65.7	0.03	11.6	0.5	12.2
9/12/02	82.8	84.8	0.06	13.2	0.5	13.7
9/12/02	87.4	89.4	0.10	9.2	0.4	9.6
Average			0.06	11.3	0.5	11.8
Stack						
9/11/02	63.8	65.8	—[a]	0.3	0.7	0.9
9/12/02	82.9	84.4	—	0.3	0.9	1.2
9/12/02	87.9	89.6	—	0.3	0.8	1.2
Average				0.3	0.8	1.1

[a] Not analyzed (all values will be <0.1 $\mu g/Nm^3$).

Table B-4
OH Mercury Data for Site S4 with the SCR Bypassed

	Hours into Test		$\mu g/Nm^3$			
Date	**Start**	**End**	**Hg_p**	**Hg^{2+}**	**Hg^0**	**Hg_{Total}**
AH Outlet						
10/16/02	898.0	900.0	0.14	8.3	5.9	14.4
10/16/02	891.5	893.5	0.05	8.0	6.5	14.6
10/17/02	923.0	925.0	0.05	6.8	4.5	11.3
Average			0.08	7.7	5.6	13.4
Stack						
10/16/02	898.3	900.0	—[a]	0.4	6.9	7.2
10/16/02	891.5	893.2	—	0.7	7.2	7.9
10/17/02	923.0	924.7	—	0.3	7.2	7.4
Average				0.5	7.1	7.5

[a] Not analyzed (all values will be <0.1 $\mu g/Nm^3$).

B.3 Mercury Measurements Made at Site S5

Complete OH Data Set

Table B-5
OH Mercury Data for Site S5 for Unit with the SCR

Date	Hours into Test		μg/Nm³			
	Start	End	Hg_p	Hg^{2+}	Hg^0	Hg_{Total}
SCR Inlet						
08/17/02	538.6	540.0	0.16	7.5	5.6	13.3
08/18/02	565.1	566.6	0.08	6.0	8.8	14.9
08/21/02	634.1	635.6	0.04	4.7	9.1	13.8
Average			0.09	6.1	7.8	14.0
SCR Outlet						
08/17/02	538.4	539.9	0.07	11.7	0.6	12.4
08/18/02	565.1	566.6	0.04	10.7	3.3	14.0
08/21/02	634.1	635.6	0.02	10.3	2.4	12.7
08/22/02	665.1	666.6	0.00	15.6	5.1	20.7
08/23/02	686.5	688.0	0.02	10.5	2.3	12.8
Average			0.03	11.8	2.7	14.5
ESP Inlet						
08/21/02	638.8	640.3	0.13	11.7	0.8	12.6
08/22/02	665.3	666.8	0.00	18.4	1.0	19.4
08/23/02	689.0	690.5	0.09	20.2	0.5	20.8
Average			0.07	16.8	0.8	17.7
ESP Outlet						
07/26/02	12.1	14.1	0.09	11.7	0.6	12.4
07/27/02	38.3	40.3	0.25	8.2	0.6	9.1
07/28/02	57.3	59.3	0.01	7.7	0.9	8.6
08/15/02	493.9	495.4	0.03	14.2	0.6	14.8
08/17/02	543.0	544.5	0.01	10.7	0.6	11.3
08/19/02	590.0	591.5	0.00	8.7	0.6	9.3
08/21/02	637.4	638.9	0.00	10.4	0.9	11.3
08/22/02	665.3	666.8	0.01	19.1	0.9	20.0
Average			0.05	11.3	0.7	12.1
Stack						
08/17/02	543.6	545.1	0.03	0.4	0.8	1.2
08/21/02	637.5	639.0	0.01	0.4	1.2	1.6
Average			0.02	0.4	1.0	1.4

Table B-6
OH Mercury Data for Site S5 for Unit Without an SCR

Date	Hours into Test		$\mu g/Nm^3$			
	Start	End	Hg_p	Hg^{2+}	Hg^0	Hg_T
ESP Inlet						
08/13/02	446.3	447.8	0.01	10.7	1.4	12.1
08/14/02	472.2	473.7	0.10	11.7	2.8	14.7
08/16/02	515.8	517.3	0.03	10.1	3.7	13.8
Average			0.05	10.8	2.6	13.5
ESP Outlet						
07/26/02	11.4	13.4	0.02	8.7	4.1	12.8
07/27/02	38.3	40.3	0.03	7.1	4.2	11.3
07/28/02	57.2	59.2	0.01	5.6	4.4	10.0
08/13/02	446.3	447.8	0.00	8.1	5.8	13.8
08/14/02	472.2	473.7	0.00	9.4	5.1	14.5
08/16/02	515.8	517.3	0.00	7.1	6.0	13.1
08/23/02	682.8	684.3	0.01	9.5	3.1	12.6
Average			0.01	7.9	4.7	12.6
Stack						
08/13/02	446.1	447.6	0.00	0.4	6.7	7.1
08/14/02	473.3	474.4	0.01	0.7	5.9	6.5
08/15/02	494.0	495.5	0.00	0.4	5.6	6.0
Average			0.00	0.5	6.1	6.6

Table B-7
Coal Mercury and Chloride Analyses

Date	Chloride, ppm	Mercury, ppm
07/26/2002	450	0.14
07/28/2002	430	0.14
08/01/2002	440	0.14
08/05/2002	500	0.12
08/13/2002	500	0.13
08/15/2002	480	0.15
08/19/2002	490	0.13
08/21/2002	460	0.15
08/23/2002	500	0.11
Average	472	0.13
Standard Deviation	28	0.013

B.4 Mercury Measurements Made at Site S6

Complete OH Data Set

Table B-8
OH Mercury Data for Site S6 for Unit 1 (SCR)

Date	Hours into Test Start	Hours into Test End	$\mu g/Nm^3$ Hg_p	Hg^{2+}	Hg^0	Hg_{Total}
SCR Inlet						
09/24/02	81.9	83.5	0.03	4.1	3.0	7.2
09/25/02	106.0	107.2	0.05	6.7	4.0	10.7
09/26/02	129.1	130.6	—[a]	5.5	3.8	9.2
09/26/02	133.3	135.3	—	7.0	4.1	11.1
Average			0.04	5.8	3.8	9.0
SCR Outlet						
09/24/02	82.0	83.5	0.03	5.5	1.1	6.7
09/25/02	106.0	107.2	0.04	7.7	1.6	9.4
09/26/02	129.1	130.6	—	6.6	1.8	8.3
09/26/02	133.3	135.3	0.01	8.5	1.6	10.2
Average			0.03	7.1	1.5	8.6
ESP Inlet						
09/24/02[b]	**85.8**	**86.3**	**—**	**2.1**	**0.9**	**3.1**
09/24/02	87.4	88.9	0.95	9.9	0.3	11.2
09/25/02	109.9	111.3	0.70	7.3	0.7	8.7
09/26/02	129.1	130.6	0.75	8.3	0.4	9.4
Average			0.80	8.5	0.5	9.8
Stack						
09/22/02	40.0	42.0	—	6.0	0.2	6.2
09/23/02	62.8	64.3	—	8.9	0.4	9.3
09/24/02	85.8	87.3	—	14.3	0.5	14.9
09/25/02	109.8	111.3	0.00	8.3	1.2	9.5
09/26/02	129.1	130.6	—	7.5	1.5	9.0
10/08/02	424.8	426.3	—	11.8	0.7	12.6
10/11/02	497.0	498.5	—	10.6	0.5	11.1
10/12/02	518.0	520.0	—	8.2	0.2	8.4
10/13/02	542.0	543.5	0.01	9.0	0.2	9.3
10/14/02	564.0	566.0	—	8.0	0.6	8.7
10/17/02	636.5	638.5	—	10.6	0.2	10.8
10/18/02	661.7	663.7	—	8.0	3.4	11.3
Average			0.00	9.3	0.8	10.1

[a] Not analyzed (all values will be <0.1 $\mu g/Nm^3$).
[b] Bold values not included in averages as there was a problem that occurred during sampling.

Table B-9
OH Mercury Data for Site S6 for Unit 2 (SCR bypassed)

	Hours into Test		$\mu g/Nm^3$			
Date	**Start**	**End**	**Hg_P**	**Hg^{2+}**	**Hg^0**	**Hg_{Total}**
ESP Inlet						
10/08/02	425.2	426.5	3.74	6.0	0.5	10.2
10/12/02	518.0	519.5	1.44	7.1	0.3	8.8
10/18/02[a]	657.8	659.3	**9.16**	**1.0**	**0.1**	**10.3**
Average			2.59	6.6	0.4	9.5
Stack						
09/22/02[b]	39.8	41.8	—[c]	6.6	0.0	6.6
09/23/02	63.3	64.8	—	7.1	0.2	7.3
09/25/02	110.2	111.7	0.00	7.9	0.6	8.5
10/08/02	424.8	426.8	—	7.2	1.4	8.6
10/11/02	497.3	498.8	—	4.6	0.8	5.4
10/12/02	518.0	520.0	—	6.5	1.5	8.0
10/13/02	542.0	543.5	0.01	6.0	1.7	7.7
10/14/02	564.0	566.0	—	5.5	1.5	7.0
10/17/02	636.6	638.6	—	5.3	1.2	6.5
10/18/02	661.7	663.7	—	6.8	0.8	7.7
Average			0.01	6.0	1.3	7.3
Standard Dev.			0.01	0.9	0.4	1.1

[a] Bold values not included in averages as sample appears to be a clear outlier.
[b] Data from 9/22 through 9/25/02 was collected prior to the SCR being bypassed for this unit and are not included in the averages.
[c] Not analyzed (all values will be <0.1 $\mu g/Nm^3$).

Table B-10
OH Mercury Data for Site S6 for Unit 4 (no SCR)

	Hours into Test		$\mu g/Nm^3$			
Date	Start	End	Hg_P	Hg^{2+}	Hg^0	Hg_{Total}
Stack						
10/08/02	424.7	426.2	—[a]	5.8	2.1	7.9
10/11/02	497.3	498.8	—	4.6	1.1	5.7
10/12/02	518.0	520.0	0.00	4.4	1.2	5.6
10/13/02	542.0	543.5	0.02	3.5	1.8	5.4
10/14/02	564.0	566.0	—	2.0	2.0	4.0
10/17/02	636.5	638.5	—	4.1	2.2	6.2
10/18/02	661.7	663.7	—	3.4	2.2	5.6
Average			0.01	4.0	1.8	5.8

[a] Not analyzed (all values will be <0.1 $\mu g/Nm^3$).

Table B-11
Coal Mercury and Chloride Analyses for Site S6

Date	Unit Collected	Chloride, ppm	Mercury, ppm
09/24/2002	1 (SCR)	1210	0.084
09/24/2002	2 (SCR bypassed)	1520	0.052
09/26/2002	1 (SCR)	871	0.072
09/26/2002	2 (SCR bypassed)	635	0.055
10/08/2002	1 and 2[a]	1170	0.063
10/08/2002	4 (no SCR)	1320	0.066
10/12/2002	1 and 2[a]	962	0.069
10/18/2002	1 (SCR)	794	0.070
10/18/2002	4 (no SCR)	706	0.064
Average		1020	0.066
Standard Deviation		300	0.0094

[a] Composite sample from Units 1 and 2.

C
COMPLETE AUXILIARY FLUE GAS DATA FOR ALL SITES

Table C-1
Auxiliary Flue Gas Data for Site S2 with SCR in Service

Date	Time into the Test, hr	Flue Gas Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
SCR Inlet					
07/17/02	58.0	9.97	0.1609[b]	14.8	3.7
07/18/02	85.6	9.57	3.2881	15.1	3.8
07/19/02	106.9	9.79	2.2725	15.0	3.9
Average		9.77	2.7803	15.0	3.8
SCR Outlet					
07/17/02	58.0	11.00	3.2452	14.8	4.6
07/18/02	85.6	10.79	0.8248[a]	14.8	4.8
07/19/02	106.7	10.71	3.4642	14.8	4.4
Average		10.83	3.3547	14.8	4.6
ESP Inlet					
07/18/02	90.1	11.36	0.0385[a]	13.8	5.6
07/19/02	110.8	11.15	1.8872	13.9	5.8
Average		11.25	1.8872	13.9	5.7
ESP Outlet					
07/18/02	90.8	11.40	0.0024	13.7	5.8
07/19/02	110.9	10.54	0.0018	13.7	5.8
Average		10.97	0.0021	13.7	5.8
Stack					
07/18/02	91.2	17.45	0.0008	13.3	6.4
07/20/02	132.9	26.25	0.0025	13.1	6.5
Average		21.85	0.0016	13.2	6.5

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.
[b] Dust loadings are lower than expected, attributed to ash loss upon removal of probe and single-point sampling, and not included as part of the average.

Table C-2
Auxiliary Flue Gas Data for Site S4 with SCR in Service

Date	Time into Test, hr	Flue Gas Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
SCR Inlet					
9/11/2002	63.8	9.5	1.3396	15.5	3.5
9/12/2002	86.9	9.6	2.1084	14.3	4.6
9/13/2002	107.7	11.3	2.3317	15.3	3.5
Average		10.1	1.9266	15.0	3.9
SCR Outlet					
9/11/2002	63.8	8.6	2.7819	15.1	3.7
9/12/2002	87.0	14.0	4.0879	14.5	4.4
9/13/2002	107.8	10.3	2.7819	15.1	3.6
Average		10.9	3.2172	14.9	3.9
Air Preheater Outlet					
9/11/2002	63.7	8.6	1.2303	13.4	5.5
9/12/2002	82.8	8.3	1.2135	13.0	6.0
9/12/2002	87.4	9.0	0.8638	11.2	8.0
Average		8.6	1.1025	12.5	6.5
Stack					
9/11/2002	63.8	15.7	0.0000	11.8	7.4
9/12/2002	82.9	17.3	0.0000	11.4	7.9
9/12/2002	87.9	12.6	0.0000	11.3	8.0
Average		15.2	0.0000	11.5	7.8

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

Table C-3
Auxiliary Flue Gas Data for Site S4 with SCR Bypassed

Date	Time into Test, hr	Flue Gas Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
Air Preheater Outlet					
10/16/2002	898.0	10.2	1.2291	11	8.0
10/16/2002	891.5	8.2	0.9940	11	8.0
10/17/2002	923.0	8.3	1.4883	11.2	7.8
Average		8.9	1.2371	11.1	7.9
Stack					
10/16/2002	898.3	15.4	0.0084	11.2	7.8
10/16/2002	891.5	12.3	0.0032	11.1	7.9
10/17/2002	963.0	14.1	0.0080	11.1	7.9
Average		13.9	0.0065	11.1	7.9

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

Table C-4
Auxiliary Flue Gas Data for Site S5 for the Unit with an SCR

Date	Time into Test, hr	Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
SCR Inlet					
08/17/02	538.6	10.68	16.2456	14.7	4.7
08/18/02	565.1	10.83	6.5134	13.9	5.6
08/21/02	634.1	10.45	3.5652	14.2	4.7
Average		10.65	8.7747	14.3	5.0
SCR Outlet					
08/17/02	538.4	9.51	4.6314	14.3	5.1
08/18/02	565.1	9.37	3.7380	13.1	6.5
08/21/02	634.1	8.31	3.0199	13.4	6.0
08/22/02	665.1	9.48	2.3088	14.0	5.5
08/23/02	686.5	8.63	3.3436	14.0	5.5
Average		9.06	3.4083	13.8	5.7
ESP Inlet					
08/21/02	638.8	8.67	2.1219	12.9	6.8
08/22/02	665.3	9.26	1.7475	13.2	6.4
08/23/02	689.0	8.73	1.1852	13.2	6.4
Average		8.89	1.6848	13.1	6.5
ESP Outlet					
07/26/02	12.1	9.30	0.0739	13.0	6.6
07/27/02	38.3	8.94	0.1573	13.2	6.4
07/28/02	57.3	9.08	0.0669	13.2	6.4
08/15/02	493.9	8.90	0.1726	13.3	6.3
08/17/02	543.0	9.27	0.0284	12.2	7.4
08/19/02	590.0	6.79	0.0082	12.2	7.4
08/21/02	637.4	8.57	0.0521	12.7	7.0
08/22/02	665.3	8.95	0.0412	13.6	5.9
Average		8.73	0.0751	12.9	6.7
Stack					
08/17/02	543.6	13.88	0.0061	11.7	8.0
08/21/02	637.5	12.26	0.0085	12.0	7.5
Average		13.07	0.0073	11.9	7.8

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

Table C-5
Auxiliary Flue Gas Data for Site S5 for the Unit Without an SCR

Date	Time into Test, hr	Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
ESP Inlet					
08/13/02	446.3	8.3	0.2117	13.6	6.0
08/14/02	472.2	8.1	1.8369	13.8	6.0
08/16/02	515.8	9.3	0.4373	13.3	6.3
Average		8.7	0.8287	13.6	6.1
ESP Outlet					
07/26/02	11.4	9.1	0.0711	12.8	6.8
07/27/02	38.3	9.1	0.1078	13.3	6.3
07/28/02	57.2	8.9	0.0487	13.3	6.3
08/13/02	446.3	8.5	0.0091	13.0	6.6
08/14/02	472.2	8.1	0.0259	12.9	6.7
08/16/02	515.8	8.9	0.0130	12.4	7.2
08/23/02	682.8	10.7	0.0419	12.4	7.2
Average		9.0	0.0453	12.9	6.7
Stack					
08/13/02	446.1	13.6	0.0034	12.8	6.9
08/14/02	473.3	13.2	0.0111	12.7	7.0
08/15/02	493.8	13.6	0.0045	12.7	7.0
Average		13.5	0.0063	12.7	7.0

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

Table C-6
Auxiliary Flue Gas Data for Site S6 for Unit 1 (SCR)

Date	Time into Test, hr	Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
SCR Inlet					
09/24/02	27.4	9.04	3.4195	15.2	4.1
09/25/02	28.4	9.01	3.7122	13.4	6.1
09/26/02	29.4	9.03	4.2123	15.2	4.2
09/26/02	29.6	8.98	3.5784	15.0	4.4
Average		9.01	3.7306	14.7	4.7
SCR Outlet					
09/24/02	27.4	8.36	3.7555	15.1	4.3
09/25/02	28.4	8.89	3.7580	15.2	4.1
09/26/02	29.4	8.74	5.1397	15.4	3.9
09/26/02	29.6	8.94	4.0159	15.2	4.2
Average		8.73	4.1673	15.2	4.1
ESP Inlet					
09/24/02	27.6	10.51	0.4491	13.4	4.7
09/24/02	27.6	8.82	3.1538	13.4	4.7
09/25/02	28.6	8.05	2.1157	13.9	5.6
09/26/02	29.4	8.33	5.2099	14.4	5.0
Average		8.93	2.7321	13.8	5.0
Stack					
09/22/02	25.7	10.09	0.0111	13.5	6.0
09/23/02	26.6	9.62	0.0076	13.3	6.3
09/24/02	27.6	9.69	0.0059	13.4	6.2
09/25/02	28.6	9.17	0.0213	13.0	6.6
09/26/02	29.4	9.49	0.0074	13.5	6.0
10/08/02	41.7	9.64	0.0053	12.8	6.8
10/11/02	44.7	10.15	0.0044	12.8	6.8
10/12/02	45.6	9.76	0.0210	13.2	6.4
10/13/02	46.6	9.11	0.0335	12.9	6.7
10/14/02	47.5	8.65	0.0291	12.8	6.8
10/17/02	50.5	8.45	0.0292	12.5	7.1
10/18/02	51.6	8.29	0.0221	13.2	6.4
Average		9.34	0.0165	13.1	6.5

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

Table C-7
Auxiliary Flue Gas Data for Site S6 for Unit 2 (SCR bypassed)

Date	Time into Test, hr	Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
ESP Inlet					
10/08/02	41.7	9.10	4.0591	15.4[b]	3.5
10/12/02	45.6	9.34	3.2689	15.4	3.9
10/18/02	51.4	7.72	4.8572	15.4[b]	3.7[b]
10/18/02	51.5	6.95	4.7264	15.4[b]	3.7[b]
Average		8.28	4.2279	15.4	3.7
Stack					
09/22/02	25.7	8.56	0.0118	13.2	6.4
09/23/02	26.6	8.32	0.0119	12.8	6.8
09/25/02	28.6	7.59	0.0080	13.4	6.2
10/08/02	41.7	7.82	0.0068	13.4	6.1
10/11/02	44.7	8.42	0.0082	13.3	6.3
10/12/02	45.6	8.20	0.0039	13.2	6.4
10/13/02	46.6	7.59	0.0254	13.1	6.5
10/14/02	47.5	7.05	0.0237	12.9	6.7
10/17/02	50.5	6.97	0.0148	13.1	6.5
10/18/02	51.6	7.18	0.0349	13.2	6.4
Average		7.77	0.0150	13.2	6.4

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.
[b] Invalid data: average was used.

Table C-8
Auxiliary Flue Gas Data for Site S6 for Unit 4 (no SCR)

Date	Time into Test, hr	Moisture, %	Dust Loading,[a] gr/dscf	CO_2, %	O_2, %
Stack					
10/08/02	41.7	7.82	0.0460	14.3	5.2
10/11/02	44.7	8.93	0.0022	14.5	4.9
10/12/02	45.6	8.52	0.0265	14.8	4.6
10/13/02	46.6	7.95	0.0587	14.7	4.7
10/14/02	47.5	7.28	0.0463	14.5[b]	4.9[b]
10/17/02	50.5	6.87	0.0521	14.7	4.7
10/18/02	51.6	6.99	0.0398	14.3	5.2
Average		7.77	0.0388	14.5	4.9

[a] Dust loadings were collected as part of the OH testing using the EPA Method 17 procedure and, therefore, are not for compliance purposes.

[b] Invalid data: average was used.

D
QUALITY ASSURANCE/QUALITY CONTROL

This appendix provides detailed quality assurance/quality control (QA/QC) procedures that were used for the sampling activities. The most important QA/QC parameter for any sampling activity is the people who perform the work. All who participated in the sampling activities for this project had extensive training and experience in the proper procedures.

Ontario Hydro (OH) Method

To provide a high level of QA/QC for this project, all liquid samples (from the OH mercury [Hg] speciation train impingers as outlined in Appendix A), including those used as blanks and spikes, were analyzed on-site by the Energy & Environmental Research Center (EERC). The primary advantage of on-site analysis is that Hg analyses can usually be obtained within 24 hr after the sampling. So if there is a problem, it can be corrected when the sampling people are on-site. The following are specific QC procedures for the OH sampling.

Instrument Setup and Calibration

A Leeman Labs PS200 cold-vapor atomic absorption instrument was used in the field for Hg determination. The instrument was set up for absorption at 253.7 nm, with a carrier gas of nitrogen and 10% $SnCl_2$ in 10% HCl as the reductant. Each day, the drying tube and acetate trap were replaced, and the tubing was checked. The rinse container was then cleaned and filled with a fresh solution of 10% HCl. After the pump and lamp were turned on and warmed up for 45 min, the aperture was set to the manufacturer specifications. A four-point calibration curve was then completed using matrix-matched standards. The detector response for a given standard was logged and compared to specifications to ensure the instrument had been properly set up. A QC standard of a known analyte concentration was analyzed immediately after the instrument was standardized in order to verify the calibration. This QC standard was prepared from a different stock than the calibration standards. Requirements stated that the values obtained must read within 5% of the true value before the instrument was used. After the initial QC standardization was completed, standards were run every ten samples to check the slope of the calibration curve. One in every ten samples was run in triplicate and spiked to verify analyte recovery. A QC chart was also maintained by the EERC chemist to monitor the long-term precision of the instrument.

Presampling Preparation

All data sheets, volumetric flasks, and petri dishes used for sample recovery were marked with preprinted labels. The liquid samples were recovered into premarked volumetric flasks, logged, and then analyzed on-site. The stack filter samples were placed in premarked petri dishes, then taken back to the EERC, where they were analyzed using mixed-acid digestion techniques. The prestack filter samples were placed in premarked containers, logged, and then analyzed on-site using a Milestone DMA-80 instrument. The labels contained identifying data, including date, time, run number, and sample port location, which correlate back to the data sheets.

Glassware and Plasticware Cleaning and Storage

All glass volumetric flasks and transfer pipettes used in the preparation of analytical reagents and calibration standards were designated as "Class A" to meet American Society for Testing and Materials specifications. Prior to being used for the sampling, all glassware was washed with hot soapy water, then rinsed with deionized water three times, then soaked in 10% $^{v}/_{v}$ nitric acid for a minimum of 4 hr, then rinsed an additional three times with deionized water, and dried. The glassware was stored in closed containers until it was used at the plant.

Analytical Reagents

All acids used for the analysis of Hg were trace metal-grade. Other chemicals used in the preparation of analytical reagents were analytical reagent-grade. The calibration standards used for instrument calibration and the QC standards used for calibration verification were purchased commercially and certified to be accurate within ±0.5% and traceable to National Institute of Standards and Technology Standard Reference Materials.

Blanks and Spikes

As part of the QA/QC, a field blank was associated with sampling at each location. A field blank is a complete impinger train including all glassware and solutions that is taken out to the field during sampling and exposed to ambient conditions. These sample trains were then taken apart and the solutions recovered and analyzed in the same manner as those sample trains used for sampling activities. If the field blank showed contamination above instrument background levels, steps were then taken to eliminate or reduce the contamination to below background levels.

As part of the QA/QC, a field spike was also associated with each test condition. A field spike was prepared by the field manager at a level similar to the field samples. These sample trains were then taken apart, and the solution was recovered and analyzed in the same manner as those sample trains used for sampling activities. The target range for recovery of the field spike was ±20%.

The results of the blanks and spikes associated with each of the test sites are shown in Tables D-1–D-7. With very few exceptions, blanks were at or near detection limits and results of the spiked samples were within the 20% range required by the method.